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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/081,425	02/22/2002	Rajendra Pendse	CPAC 1011-2 US	9980

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EXAMINER

GEYER, SCOTT B

ART UNIT

PAPER NUMBER

2829

DATE MAILED: 02/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/081,425

Applicant(s)

PENDSE, RAJENDRA

Examiner

Scott B. Geyer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 8-11 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-17 is/are allowed.
- 6) ☒ Claim(s) 1 is/are rejected.
- 7) ☒ Claim(s) 2-7 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 May 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Election/Restrictions*

**1A.** Paragraph **1E** of the previous office action (paper no. 6) instructed the applicant that a:

*reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).*

Applicant has failed to make an election of the invention in the response to this requirement in paper no. 9, stating only:

*claims 1-17 are in the application, of which 8-11 have been withdrawn as being directed to a nonelected invention; claims 1-7 and 12-17 are now under consideration.*

**1B.** Therefor, applicant's election of claims 1-7 in Paper No. 6 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

**1C.** This application contains claims 8-11 drawn to an invention nonelected without traverse in Paper No. 6. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

### *Specification*

**2.** The specification as amended by the applicant is acceptable.

***Drawings***

3. The drawings are objected to because of minor informalities such as photocopy marks on figures 1-5. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance. Applicant should note that newly added objections to the drawings does not affect the finality of this office action.

***Claim Rejections - 35 USC § 102***

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

**4A.** Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Yamaji (5,925,936).

As to claim 1, Yamaji teaches a method of encapsulating flip chip interconnects. A quantity of thermoplastic resin 3 is disposed upon the active side of a chip 5. The resin 3 surrounds the connection electrodes 4 as shown in figure 3A. After the resin 4 has been applied to the chip 5, the chip is bonded to a mounting substrate 6, wherein the connection electrodes 4 attach to substrate electrodes (bonding pads) 7.

**4B.** Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Witzman et al. (6,037,192).

As to claim 1, Witzman et al. teach a method of encapsulating flip chip interconnects, as shown in figures 3 and 4. In figure 3, a quantity of polymer adhesive (resin) 18 is applied to components (chips) 20. The adhesive is applied to the side of

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the components having interconnects 22. After the polymer adhesive 18 is applied to the components 20, the components 20 are bonded to substrates 10, wherein the substrates 10 possess conductors 12 and solderable pads (bonding pads) 16. The interconnects 22 of the component directly contact the solderable pads 16 to effect the electrical connection.

**4C.** Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Capote et al. (6,297,560 B1).

As to claim 1, Capote et al. teach a method of encapsulating flip chip interconnects. As shown in figure 4, solder bumps (interconnects) 14 on the active side of a chip 10 are coated in encapsulant material (resin) 22. After the application of the encapsulant 22, the chip 10 is bonded to a substrate 20, such that the solder bumps 14 of the chip 10 electrically connect to solder pads (bonding pads) 12 of the substrate 20.

#### ***Allowable Subject Matter***

5. Claims 2-7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, as referenced in the previous office action, paper no. 6.

6. Claims 12-17 are allowed.

7. The following is a statement of reasons for the indication of allowable subject matter:

Newly introduced independent claim 12 recites allowable subject matter from dependent claim 2 as was noted in the previous office action (paper no. 6); claims 13 and 14 are dependent upon claim 12.

Newly introduced independent claim 15 recites allowable subject matter from dependent claim 5 as was noted in the previous office action (paper no. 6). Claims 16 and 17 are dependent upon claim 15.

### ***Response to Arguments***

8. Applicant's arguments filed January 16<sup>th</sup>, 2003 have been fully considered but they are not persuasive.

8A. Applicant has asserted that neither Yamaji (5,925,936), Witzman, et al. (6,037,192), Chino et al. (6,184,066 B1) or Capote et al. (6,297,560 B1) teach applicant's invention of claim 1, either alone or in combination. The examiner disagrees for the reasons as follows:

8B. Yamaji (5,925,936) –

The applicant asserts that Yamaji does not teach or suggest applying a limited quantity of encapsulant to the bumps on the chip, nor does Yamaji teach or suggest displacement of encapsulant material from between the respective bumps and pads during bonding. Firstly, Yamaji does teach applying a limited quantity of encapsulant to the chip, as is clearly evidenced by numeral 3 in figure 3A. As encapsulant is clearly present, and as it is not applied in an infinite (unlimited) quantity, then the amount of encapsulant is clearly a limited quantity. If the amount of encapsulant clearly shown by

figure 3A in Yamaji is not inherently a "limited quantity" as stated by the applicant, then this would mean the applicant has failed to recite one or more critical features of the present invention, i.e. a problem under 35 USC 112 (1<sup>st</sup> paragraph). Secondly, as to displacement of encapsulant material from between the bumps on the interconnect side of the chip and respective bonding pads on the substrate, it is clear from figure 3B that displacement has occurred due to the slanted lines depicting the edges of the encapsulant material. Further, it is inherent from figures 3A and 3B that displacement of encapsulant would occur due to the necessity of the electrode 7 and brazing material 8 needing space to exist. It is well known that dynamic material, such as uncured encapsulant material, would be displaced by a static object, such as an electrode 7, as the static object is pushed into the space occupied by the dynamic material.

**8C. Witzman et al. (6,037,192) –**

The applicant has asserted that Witzman does not teach or suggest applying a limited quantity of encapsulant to the bumps on the chip, or curing of the encapsulant after forming the bump-to-pad interconnect. Firstly, the 'first embodiment' of Witzman et al. was not relied upon by the examiner, and has no bearing on the rejection made. Secondly, Witzman et al. does teach applying a limited quantity of encapsulant to a chip, for the same reasons as stated above for Yamaji. Thirdly, Witzman et al. does teach curing of the encapsulant material as evidenced by column 6, lines 1-16, with special emphasis on lines 12-16.

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**8D. Chino et al. (6,184,066 B1) –**

Chino et al. states in the abstract section that encapsulant can be applied to the chip or the submount (wherein application of resin to the chip pertains to the applicant's invention). Flip-chip bonding is also clearly shown in the figures, for example figures 6G & 6H, figures 16E & 16F and figure 17C. However, the Chino et al. reference is withdrawn as none of the figures, or series of figures depict a first step of application of resin to the chip and then bonding of the chip to a substrate. Applicant should note however, that withdrawal of a reference does not alter the finality of this action.

**8E. Capote et al. (6,297,560 B1) –**

Applicant has recited certain characteristics from the Capote et al reference, such as figure 4 (which clearly depicts a chip 10 with underfill material 22 being attached to a substrate 20), and certain column and line notations were also cited, such as col. 6, lines 53 – col. 7 line 3, and col. 7 lines 3-16. However, the applicant has not stated on the record how the Capote et al. reference is lacking or what the reference does not teach, as it has been applied to the rejection of claim 1. Therefore, the argument against the Capote et al. reference is considered non-responsive. Inasmuch, the Capote et al. reference does teach applying a limited quantity of encapsulant resin 22 to at least interconnect solder bumps 14 on an interconnect side of the chip 10. The chip 10 is brought together with the substrate 20 such that the solder pads 12 on the substrate 20 are bonded to the solder bumps 14 of the chip 10. Further, displacement of resin would be inherent due to the necessity of the solder pads 12 needing space to exist. It is well known that dynamic material, such as uncured encapsulant material,



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would be displaced by a static object, such as solder pads 12, as the static object is pushed into the space occupied by the dynamic material.

### ***Conclusion***

**9. THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

**10.** Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott B. Geyer whose telephone number is (703) 306-5866. The examiner can normally be reached on weekdays, between 10:00am - 6:30pm. The examiner may also be reached via e-mail: [scott.geyer@uspto.gov](mailto:scott.geyer@uspto.gov)

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (703) 308-1233. The fax phone numbers for the organization where this application or proceeding is assigned are (703)

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872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

S.B.G.

S.B.G.  
February 7, 2003

  
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